

Abstract

Maltreatment largely occurs in a multiple-risk context. The few large studies adjusting for confounding factors have raised doubts about whether low educational achievement results from maltreatment or co-occurring risk factors. This study examined prevalence, risk and protective factors for low educational achievement among children involved with the child protection system compared to other children. We conducted a population-based record-linkage study of children born in Western Australia who sat national Year 3 reading achievement tests between 2008-2010 (N=46,838). The longitudinal study linked data from the Western Australian Department of Education, Department of Child Protection and Family Support, Department of Health, and the Disability Services Commission. Children with histories of child protection involvement (unsubstantiated maltreatment reports, substantiations or out-of-home care placement) were at three-fold increased risk of low reading scores. Adjusting for socio-demographic adversity partially attenuated the increased risk, however risk remained elevated overall and for substantiated (OR=1.68) and unsubstantiated maltreatment (OR=1.55). Risk of low reading scores in the out-of-home care group was fully attenuated after adjusting for socio-demographic adversity (OR=1.16). Attendance was significantly higher in the out-of-home care group and served a protective role. Neglect, sexual abuse, and physical abuse were associated with low reading scores. Pre-existing adversity was also significantly associated with achievement. Results support policies and practices to engage children and families in regular school attendance, and highlight a need for further strategies to prevent maltreatment and disadvantage from restricting children's opportunities for success.

Keywords: Maltreatment; Educational Outcomes; Academic Achievement; Child Protection; Out-of-home Care; Record Linkage

Introduction

There is a sizeable body of research investigating the link between child maltreatment and adverse educational outcomes. Children who have experienced abuse or neglect are at increased risk of lower levels of cognitive functioning, language development, achievement in reading and maths, grades, and school attendance, suspensions and decreased personal expectations of attending college (Eigsti & Cicchetti, 2004; Lansford et al., 2002; Leiter, 2007; Rowe & Eckenrode, 1999; Stone, 2007). Maltreated children are also less likely to finish high school and gain university qualifications, which in turn leads to unemployment and lower incomes (Mersky & Topitzes, 2010). However, as capacity has increased for larger studies that address a greater number of confounding factors, questions have been raised regarding whether such outcomes are attributable to maltreatment, or are a result of co-occurring risk factors (Boden, Horwood, & Fergusson, 2007). Given that millions of children around the world have experienced abuse or neglect (Sethi et al., 2013), it is important to understand the prevalence and risk of low educational achievement among maltreated children and to inform prevention and intervention strategies.

Maltreatment is both an adverse outcome resulting from a constellation of risk factors as well as an independent risk factor for other adverse child outcomes. Risk factors associated with maltreatment include parents being young or single, with low educational achievement and low socio-economic status, lack of social support, maternal smoking during pregnancy, substance use, or mental health problems (Sethi et al., 2013). A Western Australian cohort study found risk factors for substantiated child maltreatment include parental hospital admissions related to mental health, substance abuse and assault, along with social disadvantage and younger parental age. Children who were Aboriginal, and children with disabilities were at increased risk for substantiated maltreatment (O'Donnell et al., 2010).

Many of the same or similar factors are associated with low educational achievement, including low gestational age and birthweight, low maternal education, young parenthood, disadvantaged minority status, low SES, single parent status or changes in family structure, rigid parenting beliefs, negative parent-child interaction style, substance abuse, stressful life events, mental health problems, and domestic violence (Bradley, 2002; Fergusson, Boden, & Horwood, 2008; Gutman, Sameroff, & Cole, 2003; Kitzmann, Gaylord, Holt, & Kenny, 2003; Kolar, Brown, Haertzen, & Michaelson, 1994; Malacova et al., 2008; Moore et al., 2014).

Many studies of maltreated children have had to rely on small or highly selected samples, use of cross-sectional data, data from a single source (such as welfare records or survey data), with limited access to comparison groups and data on the broader range of risk factors affecting the child and their family. The use of linked administrative data is increasingly becoming recognised as a valuable tool in understanding the effects of maltreatment in a multiple-risk context (Fantuzzo, Perlman, & Dobbins, 2011).

Very few population level linked record studies (Fantuzzo et al., 2011; Rouse & Fantuzzo, 2009) and large surveys (Boden et al., 2007) have been conducted examining the relationship between maltreatment and low educational achievement. These studies have found mixed results regarding the impact of maltreatment on educational achievement after taking into account co-occurring risk factors, raising questions about the widely-held belief that maltreatment causes poor educational outcomes. In particular, Boden et al., (2007) in a longitudinal survey of 1,265 New Zealand children found that after controlling for confounding social, parent and child factors, the associations between child physical and sexual abuse and educational achievement (high school and tertiary qualifications) became non-significant. They concluded that social, family and individual context, rather than the child's maltreatment experiences were responsible for later educational outcomes. Conversely, Fantuzzo and colleagues found maltreatment was the strongest risk factor

(adjusted OR = 1.6) for low educational achievement in second grade students, measured by the California Achievement Tests (Rouse & Fantuzzo, 2009). Subsequent analysis showed results were only significant for some subgroups of maltreated children (Fantuzzo et al., 2011). Both studies used sound measures of educational achievement (standardised tests or attainment of qualifications) and controlled for additional risk factors, although Boden et al., (2007) controlled for many more risk factors than Rouse and Fantuzzo (2009). The conflicting and mixed results point to a need for further research to clarify the relationship between maltreatment and educational outcomes, taking into account pre-existing adversity and possible subgroup variations.

In addition, the influence of school attendance on educational achievement in child protection populations has not been studied widely. Within the general population, regular school attendance is associated with academic achievement (Hancock, Shepherd, Lawrence, & Zubrick, 2014). Reduced attendance has been found among child protection groups, especially neglected children (Fantuzzo et al., 2011). School attendance is therefore an important factor to include in relation to educational achievement with clear policy implications.

Level of child protection involvement

Although maltreated children are often treated as a homogenous group in research, it is also recognised that outcomes are likely to differ across subgroups. First, results may differ for children with unsubstantiated maltreatment reports and substantiated maltreatment. Fantuzzo et al., (2011) found that the most consistent findings for poor educational outcomes were associated with unsubstantiated maltreatment reports prior to kindergarten, which may be an indicator of chronic adverse conditions.

In addition, after substantiation some children are placed in out-of-home care while others remain at home. Although children placed in out-of-home care are generally considered

to be at particularly high risk for poor educational outcomes (Trout, Hagaman, Casey, Reid, & Epstein, 2008), the limited available evidence from studies that control for co-occurring risk factors suggests out-of-home care may have positive effects on academic engagement (Font & Maguire-Jack, 2013), and no significant effect on educational achievement (Fantuzzo et al., 2011; Font & Maguire-Jack, 2013). However, as there are few large-scale studies that address co-occurring risk factors, and the study by Font and Maguire-Jack relies on children's self-reports of academic achievement, further examination of whether maltreated children's educational outcomes are similar for children who have and have not experienced out-of-home care is warranted.

Type of Maltreatment

Educational outcomes may also vary depending on the type of maltreatment the child experienced. Reviews have suggested that neglect may be more strongly associated with academic difficulties, whereas physical abuse may be more strongly associated with behavioural problems (Stone, 2007; Trocme & Cauce, 1995). Fantuzzo and colleagues (2011) found poor educational achievement was associated with neglect, but not physical abuse. Sexual and emotional abuse were not included. None of the larger-scale studies examined all four types of maltreatment, and none assessed the relationship between emotional abuse and educational achievement.

In summary, although it is clear that children who have been maltreated are at increased risk for poor educational outcomes, larger studies that control for social and demographic risk factors have cast doubt over the relationship once confounding variables are controlled for. In addition, there are gaps regarding potential differences in outcomes for children with different levels of contact with the child protection system, and different maltreatment types, especially emotional abuse. The role of school attendance in this vulnerable population also requires examination.

The current study has three aims. First, to identify the prevalence of low educational achievement among children with different levels of contact with the child protection system. Second, to examine risk and protective factors for low educational achievement, including maltreatment, level of contact with the child protection system, type of maltreatment, attendance, and child, parent and neighbourhood factors. Third, to assess whether maltreatment remains a significant risk factor for low educational achievement after controlling for multiple risk factors.

Method

Procedure

We conducted a population based cohort study using linked records from administrative datasets. Data linkage was undertaken by the WA Data Linkage Branch within the Department of Health, following strict procedures to preserve privacy and maximise quality of the record linkage (Kelman, Bass, & Holman, 2002). De-identified datasets with a unique identification number for each individual were provided to the researchers.

Participants

The initial cohort was all children born in Western Australia who were enrolled in Year 3 and potentially eligible to sit the National Assessment Literacy and Numeracy (NAPLAN) reading test between 2008 and 2010 (N=66,098). The study included only the 70.9% of students with attendance data available (N=46,838), which excluded private school students. Half the children were male, and 10.4% were Aboriginal. The average age at the Year 3 test was 8 years and 5 months. In total, reading outcome data were available for 44,539 students (95.1%). Exemptions from the NAPLAN tests are made in certain cases, such as children with severe disabilities or recent migrants from non-English speaking backgrounds. Parents can also withdraw their children from the tests, and some children are absent from school on the day of the test.

Measures

Child characteristics. From the Midwives Notification System and Births Registrations we obtained information on gender, Aboriginality, date of birth (used to calculate age in months at the time of Year 3 tests), preterm births (<37 weeks gestation), and birthweight. Birthweight percentile for gestational age was calculated separately for boys and girls using percentile reference levels for singletons born 1990-1994 (Roberts & Lancaster, 1999a), multiples born 1990-1994 (Roberts & Lancaster, 1999b), and children born after 1995 (Dobbins, Sullivan, Roberts, & Simpson, 2013). Children in the lowest 10% were classified low birthweight for gestational age.

Disability. Information on children's disability status was obtained from the Intellectual Disabilities Exploring Answers (IDEA) database and Western Australian Register of Developmental Anomalies (WARDA). IDEA is a population-based database on individuals with disabilities, using information provided by the Disability Services Commission and the Department of Education. WARDA contains information on birth anomalies for diagnoses made any time from conception to six years of age. Children with a record in the IDEA or WARDA datasets were classified as having one or both of the following disability types: 1) intellectual disabilities, or 2) birth anomalies.

Child protection involvement. The Department for Child Protection and Family Support provided information on child maltreatment allegations (reports to the Department of suspected abuse or neglect), substantiations of maltreatment and out-of-home care. All coding was based on the child's records from birth until the time of their Year 3 NAPLAN test. For the main analysis, children were coded as having a maltreatment allegation if they had any recorded allegation. For the secondary analysis children were categorised based on their highest level of child protection contact (none, unsubstantiated allegation, substantiation with no out-of-home care, or had substantiated maltreatment and ever entered out-of-home care).

Maltreatment type was based on the presence or absence of an allegation of each of the four types of maltreatment (physical, sexual and emotional abuse, and neglect) within the child's records. Children therefore may have more than one type of maltreatment recorded, although only one maltreatment type is recorded per allegation.

School attendance. Attendance data was provided by the Department of Education for the first semester of each year. Attendance was calculated as the percentage of days attended from the potential days enrolled during the first semester of Year 3. For students that changed schools, attendance days and enrolment days were summed across two or more schools.

Parent characteristics. From the Midwives and Births data, we obtained maternal and paternal age and marital status at the child's birth, and maternal smoking during pregnancy.

Parent education. Self-reported information on both parents' highest completed level of education was provided by the WA Department of Education. We coded the highest level of completed education for either parent as 1) Year 11 or less, 2) Year 12 (the final year of secondary schooling in Western Australia), Advanced certificate, or Diploma, 3) University Degree, or 0) missing data. Missing parent education data was relatively common overall (31%), and higher among the child protection groups (48%-56% of children).

Maternal and paternal psychosocial risk factors. Parents' mental health information includes public and private in-patient admissions and public out-patient admission obtained from two sources: the Mental Health Information System and the Hospital Morbidity Data System. International Classification of Disease codes from ICD8, ICD9 and ICD10 provide diagnostic information in both data sources. Mental health contacts by mothers included a mental health diagnosis across major diagnostic categories (such as depression, anxiety disorder, schizophrenia, bipolar disorder but excluding substance-related diagnoses) prior to

the child's NAPLAN test. Parents' substance-related admissions were included where ICD codes indicated an alcohol or drug related contact.

Maternal and paternal assault related admissions included any hospital admission for an assault related injury inflicted on the parent (ICD-9: E960-E969, ICD-10: X85-Y09) that occurred any time before the child's NAPLAN test.

Community characteristics. Community variables from the Australian Bureau of Statistics were included to account for socio-economic differences (Australian Bureau of Statistics, 2008) and disparities by level of remoteness (Department of Health and Aged Care, 2001). The Socio Economic Indices for Area (SEIFA) is a neighbourhood level measure of relative social disadvantage based on place of residence at the time of the child's birth. SEIFA scores for areas are based on the national population census which is conducted every five years. SEIFA was grouped into five categories, from least disadvantaged (1) to most disadvantaged (5), plus missing. The Accessibility/Remoteness Index of Australia (ARIA) is also grouped into five categories from least remote (1) to most remote (5) and indicates the accessibility of the area in which the family lives at the time of the child's birth. Community data by collection district (approximately 400 households) was available for 91% of children. Missing SEIFA and ARIA were filled using a less precise version of the variables - more recent data from larger geographical areas (postcodes), for cases missing collection district level information.

Outcome variable - Low reading achievement. The National Assessment Program – Literacy and Numeracy (NAPLAN) was introduced in 2008, and is sat by all Australian Year 3 students in May of each year. Children were categorised as having low reading achievement if they scored in the lowest 10% of students within their test year on the NAPLAN reading test.

Data Analysis

In addition to descriptive analysis, the risk of low reading achievement for children with a maltreatment allegation, adjusted for confounding individual, parental and neighbourhood factors was examined using a multivariate logistic regression analyses. Supplementary multivariate logistic regression analyses were conducted using a) level of child protection involvement to assess differences between these subgroups and b) maltreatment type.

Our analysis was undertaken in three steps. First, we conducted univariate logistic regression to estimate the association between each predictor variable and the outcome variable. Second, we conducted each of the multivariate logistic regression analyses described above with child, parent and community risk factors included as covariates. Third we added school attendance to each of the multivariate models. Where adding attendance substantively changed the results, both are presented, otherwise only the univariate and final multivariate model results are presented. Paternal age was excluded from the models because it is closely correlated with maternal age. Results are presented using odds ratios (ORs) and 95% confidence intervals (CIs) (Tabachnick & Fidell, 2001). The data were analysed using SPSS version 22 software.

A 'missing' category was created for parent education (Cooper, McNamara, de Klerk, Davis, & Jones, 2014). Sensitivity analysis was conducted in order to assess the impact of missing data on results. For the sensitivity analysis, parent education was imputed using multiple imputation with 25 imputed datasets in SPSS (Graham, Olchowski, & Gilreath, 2007; Takahashi & Takayuki, 2013). Additional sensitivity analyses included using the full 2008-2012 dataset which had a larger sample but less complete ascertainment of child protection events, and using 'missing' data categories for SEIFA and ARIA.

Children's age in months had a positive linear effect however children who were sufficiently old to fall outside the typical range for Year 3 tests (most likely children who had

been retained) scored markedly worse. An indicator variable was added to the model to account for these children.

Ethics

Ethics approval for the study was granted by the University of WA Human Research Ethics Committee, the Department of Health Human Research Ethics Committee, and the WA Aboriginal Human Information and Ethics Committee.

Results

Descriptive statistics

Of the 46,838 children in the sample 2,716 (5.8%) had been the subject of a maltreatment allegation. Of these 1,343 had unsubstantiated allegations, 622 had substantiated maltreatment and remained at home, and 751 had substantiated maltreatment and entered out-of-home care at least once (Table 1). The prevalence of low reading achievement in the maltreatment allegation group was 30.2% compared to 11.4% of children with no allegations. Children with maltreatment allegations were over-represented in the low reading achievement group (13.2% of low scorers vs. 4.3% of children scoring above the bottom decile). Across different levels of child protection involvement, low reading achievement scores were obtained by 28.9% of children with unsubstantiated allegations only, 32.1% of children with a substantiation, and 31.1% of children who had entered out-of-home care.

The characteristics of the study population, including prevalence of risk factors is shown in Table 1. Almost all of the individual, parental and neighbourhood risk factors were more common among children with maltreatment allegations, and many had increased frequency among children with higher levels of involvement with the child protection system. In total 22.3% of children without an allegation were from the most socially disadvantaged areas, compared to 42.7% of children with unsubstantiated allegations, 46.7% of those with substantiated allegations, and 50.0% of those who had entered out-of-home care. Maternal

mental health contact was especially common among children who had entered out-of-home care 62.3%, compared to 15.4% of children with no allegations, 38.7% of those with unsubstantiated allegations and 38.3% of those with substantiated allegations. A high proportion of children with child protection involvement had missing education data for both parents (from 48.0% – 56.5%). Almost half (43.5%) of the children who had entered out-of-home care were Aboriginal, although Aboriginal children only comprised 10.4% of the study population.

Intellectual disabilities were most common among children who entered out-of-home care (8.4%). As children with intellectual disabilities can be exempted from the test, we examined participation rates and found a higher percentage of children with an intellectual disability participated in the reading test among the children with a substantiation (55.2%) than among children with other types of child protection contact (ranging from 44.3%-46.0%).

For non-Aboriginal children school absence was highest among children with substantiated maltreatment who never entered out-of-home care, (absent for 10.0% of enrolled days), followed by unsubstantiated cases (9.2% days absent), children who had entered out-of-home care (8.0% days absent) and lowest for children with no allegations (6.6% days absent). For Aboriginal children school absence levels were higher, at 26.9% among children with substantiated maltreatment who never entered out-of-home care, 25.4% among children with unsubstantiated allegations, and 18.9% among children with no allegations. School absences were lowest among children who had entered out-of-home care (15.7%).

Logistic regression analysis of risk

Table 2 shows the odds ratios for the risk of low reading achievement. Children with a maltreatment allegation remained at significantly elevated risk of low reading achievement

after adjusting for other risk factors compared to children without an allegation (OR=1.46, 95% CI [1.31,1.63]).

With the exception of paternal substance-related contacts, paternal assaults and birth anomalies, all of the risk factors were significantly associated with reading scores in both the univariate and fully adjusted models. Paternal assaults were significant in a number of the sensitivity analyses but not in the main analysis. The highest odds ratios were for intellectual disability (OR=5.19, 95% CI [4.22,6.39]), low parental education especially where both parent's education is less than Year 12 (OR=3.71, 95% CI [3.19,4.31]) or missing (OR=3.30, 95% CI [2.86,3.79]), being older than typical (OR=2.67, 95% CI [2.09,3.40]), poor attendance (OR=2.37, 95% CI [2.08,2.69]), living in the most socially disadvantaged areas (OR=2.17, 95% CI [1.91,2.46]) and being Aboriginal (OR=2.00, 95% CI [1.82,2.19]). To ensure that the results are not biased by the inclusion of unsubstantiated maltreatment reports, we also ran the analysis limiting maltreatment to substantiations rather than allegations. As results were similar, indicating a significantly elevated risk for low reading scores (OR=1.36, 95% CI [1.17, 1.57]) associated with substantiated maltreatment, we continued the analysis based on maltreatment allegations.

Multivariate logistic regression analyses were also undertaken using the four types of maltreatment (Table 3). The same risk factors were controlled for (odd ratios for these risk factors remain almost the same so are not presented again). Logistic regression analysis examining all four types of maltreatment allegations found that after adjusting for other risk factors, elevated risk was associated with allegations of sexual abuse (OR=1.53, 95% CI [1.29,1.82]), neglect (OR=1.52, 95% CI [1.30, 1.77]) and physical abuse (1.26, 95% CI [1.07, 1.49]). Emotional abuse was associated with threefold increased risk in the univariate analysis, but this effect was attenuated and non-significant in the adjusted model (OR 1.18 95% CI [0.95-1.47]).

Finally, logistic regression analyses were undertaken using the level of child protection contact (instead of any maltreatment allegation or allegation type) (Table 4). Again, the same risk factors were controlled for. Attendance differs across levels of child protection, and there was some variation in the results when attendance was included, so results are presented for Model B (controlling for all background risk factors except attendance) and Model C (adding attendance to Model B). The results from Model B showed that compared to children with no maltreatment allegations, children with unsubstantiated allegations were at increased risk of low reading achievement (OR=1.55, 95% CI[1.34,1.78]), as were children with substantiated allegations who remained at home (OR=1.68, 95% CI[1.37,2.06]). However, children who had ever entered out-of-home care did not have significantly increased risk of low reading achievement compared to children with no allegations (OR=1.16, 95% CI[0.96,1.41]).

After adding attendance to the model (Model C), however, although the changes were small we found the protective effect of out-of-home care was no longer significant, and reading scores for all three child protection groups were significantly worse than for children with no allegations. This suggests that the effect of out-of-home care on Year 3 reading scores is partially mediated by school attendance. Compared to children with no allegations, the odds ratio for low reading scores for children with unsubstantiated maltreatment was 1.49 (95% CI[1.29,1.72]), for children with substantiations was 1.63 (95% CI[1.33,2.00]), and for children who had entered out-of-home care was 1.28 (95% CI[1.05,1.55]). When presented separately by Aboriginal status, the effect of adding attendance to the model primarily affected the odds ratio for Aboriginal children in out-of-home care, but was not significant.

Sensitivity analysis produced results that generally did not differ substantively from those reported. In some models, either a greater or smaller number of the parental psychosocial risk factors were significant.

Discussion

Low reading achievement was common across children with child protection involvement, affecting over a quarter of these children (27.8%), representing a three times increased risk for low reading compared to children without child protection involvement. After controlling for a wide range of risk factors, our findings showed a small but fairly consistent association between maltreatment and low reading achievement in Year 3, across both substantiated and unsubstantiated maltreatment allegations, and most types of abuse and neglect. This is in line with research showing links between some types of maltreatment and poor outcomes (Fantuzzo et al., 2011; Mersky & Topitzes, 2010), but extends the findings of these studies to show that almost all sub-groups of children with maltreatment allegations (substantiated or unsubstantiated, and across neglect, physical and sexual abuse) are at elevated risk for academic difficulties.

Maltreatment Type and Reading Achievement

Sexual abuse and neglect were both associated with approximately 50% increased odds of low reading achievement. Physical abuse was also significantly associated with poor reading. Our finding that sexual abuse was one of the maltreatment types associated with the highest increase in risk of low reading achievement is consistent with Fergusson and colleagues' results showing sexual abuse to be associated with a wide range of adverse outcomes (Fergusson, McLeod, & Horwood, 2013), although not with their non-significant findings regarding educational outcomes (Boden et al., 2007). It is unclear why the effects of emotional abuse were fully attenuated by other risk factors whereas all other maltreatment types showed harmful effects. Emotional abuse has been linked to other poor outcomes (Crow, Cross, Powers, & Bradley, 2014; Gross, 1992; Iwaniec, Larkin, & Higgins, 2006), but remains one of the less-studied areas of maltreatment and requires further exploration.

Level of Child Protection Involvement and Reading Achievement

Although all three child protection groups had over threefold increased risk of low readings scores prior to adjustment, after controlling for pre-existing adversity the risk for the out-of-home care group was not significantly different from children with no allegations. This finding should not be interpreted to mean that children in out-of-home care are performing satisfactorily in school (almost one in three have poor reading achievement), but rather that given the highly increased risks they face through their family, community and individual characteristics as well as maltreatment experiences, we would expect them to be performing even worse.

Although the difference was small, having entered out-of-home care was associated with lower odds of poor reading achievement compared to children with substantiated or unsubstantiated allegations which suggests that out-of-home care, or other interventions or monitoring that accompany entry to care, may have a protective effect on education. This finding is new, but not inconsistent with the literature. Using data from the National Survey of Child and Adolescent Wellbeing II, Font and Maguire-Jack (2013) found increased school engagement among some of their out-of-home care groups, and suggested that the null findings for performance may be due to use of self-report measures. Runyan and Gould (1985) found increased school attendance and no difference in school grades despite higher levels of background risk, and a Swedish study found fewer children with low or no grades among the out-of-home care group (Berlin, Vinnerljung, & Hjern, 2011). Conversely, two studies using the National Survey of Child and Adolescent Wellbeing data found no significant differences in language and cognitive development between children placed in out-of-home care and those receiving in-home welfare interventions (Berger, Bruch, Johnson, James, & Rubin, 2009; Stahmer et al., 2009). Our study did not aim to specifically examine the causal ‘effects’ of out-of-home care as an intervention, but the results are suggestive of a protective role of out-of-home care (and at minimum no harmful effect). Future research will

be undertaken using longitudinal education data to come closer to estimating possible causal relationships.

Attendance

Regular school attendance was an important protective factor. Our research suggests that attendance accounts for some of the protective effect of out-of-home care on Year 3 reading results. While an association has previously been found between out-of-home care and attendance (Runyan & Gould, 1985), and between attendance and achievement in the general population (Hancock et al., 2014; Roby, 2004) the role of attendance in the relationship between out-of-home care and achievement has not previously been examined. Strategies to improve attendance among all child protection groups, particularly those that remain at home may play a valuable role in improving children's early achievement and position them better for school success in adolescence.

Adversity

Like Boden and colleagues (2007), we found some attenuation of risk for low educational achievement after taking into account other risk factors in maltreated children's lives. A high proportion of children with child protection involvement had additional risk factors, and these were especially common among children who entered out-of-home care. Over one third of children who entered out-of-home care had mothers who had been to hospital following an assault, and over half had mothers with hospital contacts for mental health and two thirds of mothers' had hospital contact for substance-related issues. The high level of risk factors supports the need to account for these in research examining outcomes for maltreated children (Fantuzzo et al., 2011; Stone, 2007).

While it is not surprising to see intellectual disability emerge as the strongest predictor of low reading scores, it highlights the importance of taking into account disabilities in

research among child protection populations. Disabilities are more common among maltreated children, and children affected by both are likely to have additional support needs.

Many of the strongest risk factors for poor educational achievement reflect issues of social disadvantage: low parental education, living in a socially disadvantaged area, and Aboriginal status. Rouse and colleagues found maltreatment had the highest OR (1.6) followed by low maternal education, poverty, homelessness and birth risks (Rouse & Fantuzzo, 2009). This differs somewhat from our findings as maltreatment was not our strongest risk factor. Public health interventions addressing adversity and disadvantage as well as child maltreatment are needed.

Closing the educational gap between Aboriginal and non-Aboriginal students is a complex task requiring sensitivity to a history of entrenched inequality (Ford, 2012). Previous research has illustrated that many expected resilience factors for Aboriginal youth were not significant (Hopkins, Taylor, D'Antoine, & Zubrick, 2012). Within the educational domain, we found school attendance was equally effective at promoting achievement outcomes for Aboriginal and non-Aboriginal students. Education officers within the Department for Child Protection and Family Support are tasked with supporting achievement and attendance among children in out-of-home care, which may contribute to the higher attendance rates for these children. Effective strategies are needed to improve attendance among other Aboriginal children, especially those with maltreatment allegations who remain at home.

Limitations and Future Research

The study had a number of limitations, although we have attempted to address them where possible. Record linkage provides extensive population data but does have limitations in that records are only created when there is contact with government agencies. Thus maltreatment was only captured for children who had contact with the child protection system and may be under-ascertained. As mental health and substance-related issues were counted

only for public and private hospital inpatients and public outpatients, there may be some bias towards undercounting these issues among higher socio-economic groups, and the data is likely to capture more severe cases of mental illness rather than cases that are dealt with in the community by general practitioners and private practice psychologists. We also did not have information on whether educational, psychological or family support services were provided so cannot control for or assess the impact of these.

Despite these limitations the data uses standardised national assessments of reading ability and using linked longitudinal data to overcome many of the limitations of previous research including small sample size, cross-sectional and point in time data. Record linkage provides the ability to capture sensitive information such as maltreatment allegations and parental hospital contacts and includes individuals who may not participate in surveys.

We only studied children in Year 3. One possible explanation for our findings regarding the association between maltreatment and achievement being closer to results from Rouse and Fantuzzo (2009) than the non-significant findings from Boden and colleagues (2007) is that the latter looked at older students (high school completions). However Mersky and Topitzes, (2010) also examined high school and university outcomes and *did* find maltreatment remained significantly associated with negative educational outcomes after controlling for a range of sociodemographic risk factors within a highly disadvantaged population. Further research should examine whether the same the relationships exist between level of child protection involvement, attendance and achievement in older children and adolescents.

Our study combined all children who had entered out-of-home care into a single group. However, there is evidence that children's outcomes may vary depending on their out-of-home care experiences, such as placement type (Rubin et al., 2008), duration of out-of-home care, and number of placement changes (Baskin & Sommers, 2011). Future research

should examine whether out-of-home care has consistent relationships with attendance and achievement, or varies depending on care experiences. Understanding other mechanisms through which entry to out-of-home care influences children's academic achievement would also be valuable. Furthermore, research should be conducted using longitudinal data and matching techniques to more fully address questions regarding the causal impact of out-of-home care placement decisions for maltreated children. The linked dataset provides the opportunity for more in-depth exploration of the relationships between different aspects of children's child protection history (including type and timing of events across childhood and more detailed examination of out-of-home care experiences). Such detail was beyond the scope of this study, however further research is planned.

Finally, linked-record population studies provide a means for monitoring changes in educational outcomes for maltreated children, and evaluating the effect of interventions. The Department for Child Protection and Family Support has fairly recently (2009) introduced Individualised Education Plans for all children in care of compulsory school age, in recognition of the need to address poor educational outcomes. There was insufficient data available after 2009 to evaluate their impact, however future research might be able to shed more light on the effectiveness of the Individualised Education Plans.

Implications for Policy and Practice

This study highlights the prevalence of low reading achievement among children in contact with the child protection system, who typically come from backgrounds of significant adversity and trauma. There is a need to continue to develop effective approaches to increase attendance, which promotes achievement amongst even these vulnerable groups of children. There is also research support for educational interventions such as tutoring, provision of extra learning materials, individualised educational and psychological support and educational liaison (Forsman & Vinnerljung, 2012). As maltreatment can affect children's achievement

via socio-emotional delays as well as cognitive delays (Trocme & Cauce, 1995), a one-size fits all approach may not be ideal.

This research does not specifically assess the effectiveness of current policies and practices in Western Australia, however the findings are consistent with the need for roles such as the Department for Child Protection and Family Support Education Officers who specifically support the educational needs of children in care, and initiatives such as Individualised Education Plans to encourage a focus on the educational needs of children in care. Although children in out-of-home care may be doing better than expected given their extensive challenges, there is still a long way to go to achieve results comparable to the general population. Children with substantiated and unsubstantiated maltreatment allegations, and children with significant social disadvantage are also at high risk of poor educational achievement by Year 3 of schooling, and would also benefit from policies and services aimed at improving educational outcomes.

Conclusions

This study provides new insight into prevalence, risk and protective factors for low reading achievement with a focus on children involved in child protection. After controlling for an extensive range of background risk factors, we found maltreatment, including unsubstantiated and substantiated cases, and neglect, physical and sexual abuse were all associated with increased risk for low reading scores. Out-of-home care was associated with a small protective effect on Year 3 reading scores and much higher school attendance. These findings highlight the need for increased attention to the educational needs of child protection populations, and should be used to inform strategies to improve educational outcomes. Further research is needed to examine whether the same relationships between child protection history, school attendance and achievement exist among older children, and across subgroups of children with different out-of-home care experiences.

Table 1. Characteristics of study population by level of child protection involvement

Characteristic	No Allegations (n = 44,122)		Unsubstantiated (n = 1,343)		Substantiated (n = 622)		OOHC (n = 751)		Total (n = 46,838)	
Age Months (Mean)	8yr5 months		8yr5 months		8yr5 months		8yr5 months		8yr5 months	
Gender										
Female	21,506	48.7%	695	51.7%	316	50.8%	349	46.5%	22,866	48.8%
Male	22,616	51.3%	648	48.3%	306	49.2%	402	53.5%	23,972	51.2%
Aboriginality										
Aboriginal	3,870	8.8%	432	32.2%	232	37.3%	327	43.5%	4,861	10.4%
Non-Aboriginal	40,252	91.2%	911	67.8%	390	62.7%	424	56.5%	41,977	89.6%
Intellectual disability	804	1.8%	61	4.5%	29	4.7%	63	8.4%	957	2.0%
Cerebral palsy or birth anomaly	2,701	6.1%	72	5.4%	39	6.3%	68	9.1%	2,880	6.1%
Preterm Birthweight percentile low for gestational age	3,197	7.2%	168	12.5%	72	11.6%	128	17.1%	3,565	7.6%
Maternal smoking	4,447	10.1%	213	15.9%	118	19.0%	175	23.3%	4,953	10.6%
Highest Parent Education										
Up to Yr11	5,398	12.2%	324	24.1%	147	23.6%	163	21.7%	6,032	12.9%
Yr 12/Certificate/Diploma	17,412	39.5%	314	23.4%	129	20.7%	136	18.1%	17,991	38.4%
University Degree	8,245	18.7%	61	4.5%	23	3.7%	28	3.7%	8,357	17.8%
Missing	13,067	29.6%	644	48.0%	323	51.9%	424	56.5%	14,458	30.9%
Marital Status										
Married/defacto	39,328	89.1%	938	69.8%	434	69.8%	438	58.3%	41,138	87.8%
Not married/unknown	4,794	10.9%	405	30.2%	188	30.2%	313	41.7%	5,700	12.2%
Maternal Age										
<20	2,945	6.7%	225	16.8%	102	16.4%	156	20.8%	3,428	7.3%
20-29	21,695	49.2%	772	57.5%	387	62.2%	419	55.8%	23,273	49.7%
30+	19,482	44.2%	346	25.8%	133	21.4%	176	23.4%	20,137	43.0%
Maternal Substance Contact	2,872	6.5%	387	28.8%	230	37.0%	484	64.4%	3,973	8.5%
Maternal Assault	1,150	2.6%	246	18.3%	160	25.7%	290	38.6%	1,846	3.9%
Maternal Mental Health Contact	6,784	15.4%	520	38.7%	238	38.3%	468	62.3%	8,010	17.1%
Paternal Substance Contact	3,489	7.9%	288	21.4%	143	23.0%	249	33.2%	4,169	8.9%
Paternal Assault	2,125	4.8%	205	15.3%	95	15.3%	152	20.2%	2,577	5.5%
Paternal Mental Health Contact	3,486	7.9%	227	16.9%	101	16.2%	160	21.3%	3,974	8.5%
Social Disadvantage										
Most Disadvantaged	9,804	22.3%	571	42.7%	289	46.7%	373	50.0%	11,037	23.6%
2	9,379	21.3%	323	24.1%	137	22.1%	190	25.5%	10,029	21.5%
3	8,858	20.1%	210	15.7%	95	15.3%	117	15.7%	9,280	19.9%
4	8,167	18.6%	151	11.3%	62	10.0%	42	5.6%	8,422	18.0%
Least Disadvantaged	7,781	17.7%	83	6.2%	36	5.8%	24	3.2%	7,924	17.0%
Remoteness	29,273	66.4%	739	55.1%	355	57.1%	482	64.4%	30,849	65.9%
2	5,034	11.4%	214	15.9%	67	10.8%	83	11.1%	5,398	11.5%
3	5,499	12.5%	175	13.0%	86	13.8%	77	10.3%	5,837	12.5%
4	3,050	6.9%	122	9.1%	62	10.0%	68	9.1%	3,302	7.1%
5	1,240	2.8%	92	6.9%	52	8.4%	39	5.2%	1,423	3.0%
Attendance (% Absent) 0-5%	22,598	51.2%	435	32.4%	186	29.9%	318	42.3%	23,537	50.3%

>5-10%	11,676	26.5%	307	22.9%	141	22.7%	160	21.3%	12,284	26.2%
>10-15%	4,828	10.9%	184	13.7%	65	10.5%	89	11.9%	5,166	11.0%
>15-25%	3,045	6.9%	178	13.3%	108	17.4%	94	12.5%	3,425	7.3%
>25%	1,975	4.5%	239	17.8%	122	19.6%	90	12.0%	2,426	5.2%
Low Reading Score	4,785	11.4%	347	28.9%	174	32.1%	204	31.1%	5,510	12.4%
Any Physical CMA	-	-	430	32.0%	242	38.9%	333	44.3%	1,005	2.1%
Any Sexual CMA	-	-	541	40.3%	215	34.6%	155	20.6%	911	1.9%
Any Emotional CMA	-	-	206	15.3%	141	22.7%	229	30.5%	576	1.2%
Any Neglect CMA	-	-	373	27.8%	261	42.0%	535	71.2%	1,169	2.5%

Table 2. Logistic regression: odds of low reading scores for children with or without maltreatment allegations

	Univariate OR (95% CI)	Multivariate OR (95% CI)
Age in months	0.96 (0.95, 0.97)	0.94 (0.94, 0.95)
Higher than typical age	2.21 (1.80, 2.70)	2.67 (2.09, 3.40)
Young or typical age	reference	reference
Boys	1.55 (1.47, 1.64)	1.63 (1.53, 1.73)
Girls	reference	reference
Aboriginal	5.14 (4.79, 5.52)	2.00 (1.82, 2.19)
Non-Aboriginal	reference	reference
Intellectual disability	6.56 (5.42, 7.93)	5.19 (4.22, 6.39)
No ID	reference	reference
Preterm birth	1.58 (1.44, 1.74)	1.25 (1.12, 1.38)
Birthweight percentile for gestational age <10th%	1.56 (1.43, 1.69)	1.17 (1.07, 1.28)
Not low birth weight	reference	reference
Maternal smoking	2.26 (2.13, 2.40)	1.25 (1.17, 1.34)
Parent education missing	6.87 (6.02, 7.85)	3.3 (2.86, 3.79)
Up to Yr11	7.67 (6.66, 8.83)	3.71 (3.19, 4.31)
Yr12/certificate/diploma	3.30 (2.89, 3.78)	2.39 (2.08, 2.75)
University degree	reference	reference
Unmarried / unknown	2.27 (2.12, 2.45)	1.13 (1.03, 1.23)
Married/defacto at birth	reference	reference
Maternal age under 20	3.23 (2.93, 3.56)	1.30 (1.16, 1.46)
20-29	1.74 (1.63, 1.85)	1.19 (1.11, 1.28)
30+	reference	reference
Maternal substance-related contact	2.60 (2.39, 2.82)	1.12 (1.00, 1.24)
No	reference	reference
Maternal assault	4.56 (4.10, 5.08)	1.16 (1.02, 1.33)
No	reference	reference
Maternal mental health	1.67 (1.56, 1.79)	1.08 (1.00, 1.17)
No	reference	reference
Paternal assault	2.30 (2.08, 2.54)	1.09 (0.97, 1.22)
No	reference	reference
Paternal mental health	1.46 (1.33, 1.60)	1.11 (1.00, 1.23)
No	reference	reference
Most disadvantaged	5.45 (4.85, 6.12)	2.17 (1.91, 2.46)
2	3.29 (2.91, 3.71)	1.74 (1.53, 1.98)
3	2.60 (2.29, 2.95)	1.66 (1.45, 1.89)
4	1.80 (1.58, 2.06)	1.33 (1.16, 1.53)
Least disadvantaged	reference	reference
ARIA remoteness – least remote	reference	reference
2	1.30 (1.19, 1.43)	1.08 (0.98, 1.18)
3	1.65 (1.52, 1.79)	1.27 (1.17, 1.39)
4	1.97 (1.78, 2.17)	1.25 (1.11, 1.39)
Most remote	4.23 (3.73, 4.8)	1.55 (1.33, 1.81)
Attendance (% absent) 0-5%	reference	reference
>5-10%	1.34 (1.25, 1.44)	1.16 (1.07, 1.25)
>10-15%	1.84 (1.68, 2.02)	1.39 (1.26, 1.53)
>15-25%	2.98 (2.71, 3.28)	1.70 (1.53, 1.89)
>25%	6.61 (5.94, 7.37)	2.37 (2.08, 2.69)
Any maltreatment allegation	3.38 (3.08, 3.71)	1.46 (1.31, 1.63)
No	reference	reference

Notes: Other disabilities (combined birth anomalies and cerebral palsy) were non-significant, as was paternal substance-related contacts.

Table 3. Logistic regression: Odds of low reading scores by maltreatment type

Allegation Types	Univariate OR (95% CI)	Multivariate OR (95% CI)
Any Physical	3.19 (2.76, 1.49)	1.26 (1.07, 1.49)
Any Sexual	2.74 (2.35, 1.82)	1.53 (1.29, 1.82)
Any Emotional	2.99 (2.46, 1.47)	1.18 (0.95, 1.47)
Any Neglect	4.24 (3.71, 1.77)	1.52 (1.30, 1.77)

Notes: Each maltreatment type was examined in a separate analysis with all other risk factors from Table 2 except 'Any maltreatment allegation'. All estimates remained relatively unchanged in the analysis. When all other maltreatment types were controlled for in a combined model, physical abuse was no longer significant

Table 4. Logistic regression: Odds of low reading scores by level of child protection involvement

Contact Level	Model A	Model B	Model C
	Univariate OR (95% CI)	Multivariate OR (95% CI)	Multivariate OR (95% CI)
All Children		without attendance	with attendance
No Allegations	reference	reference	Reference
Unsubstantiated	3.17 (2.79, 3.61)	1.55 (1.34, 1.78)	1.49 (1.29, 1.72)
Substantiated	3.69 (3.07, 4.43)	1.68 (1.37, 2.06)	1.63 (1.33, 2.00)
Out-of-home care	3.52 (2.97, 4.16)	1.16 (0.96, 1.41)	1.28 (1.05, 1.55)
Aboriginal	Model A	Model B	Model C
	Univariate OR (95% CI)	Multivariate OR (95% CI)	Multivariate OR (95% CI)
		without attendance	with attendance
No Allegations	reference	reference	reference
Unsubstantiated	1.86 (1.49, 2.31)	1.62 (1.28, 2.05)	1.57 (1.23, 1.99)
Substantiated	1.80 (1.34, 2.44)	1.44 (1.04, 1.99)	1.38 (1.00, 1.92)
Out-of-home care	1.20 (0.93, 1.55)	0.99 (0.74, 1.32)	1.16 (0.86, 1.55)
Non-Aboriginal			
No Allegations	reference	reference	reference
Unsubstantiated	2.48 (2.09, 2.94)	1.49 (1.24, 1.79)	1.44 (1.20, 1.73)
Substantiated	3.08 (2.41, 3.93)	1.81 (1.40, 2.35)	1.78 (1.37, 2.30)
Out-of-home care	3.41 (2.71, 4.30)	1.43 (1.11, 1.86)	1.47 (1.14, 1.91)

Notes: Level of child protection involvement was examined in a separate analysis with all other risk factors from Table 2 except 'Any maltreatment allegation'. All estimates remained relatively unchanged in the analysis.

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